

PSM Implementation, Assembly and Alignment Details

[0066] When aligning a PSM, there is a choice as to where the test arm and reference arm point images are located relative to each other when the test arm is focused on a surface (e.g., a cat's eye type reflection). The preferred embodiment of the PSM has a minimum number of adjustments that are typically fixed permanently during assembly. Specifically, the point source to test arm lens element centering is fixed by machining tolerances to a level that is adequate to ensure high quality imaging. Focus of the collimating lens in the test arm may be fixed or adjustable depending upon the need for collimated output. Typically, the focussing lens is permanently fixed, and good, though imperfect, collimation is acceptable removing the need for a focus adjustment of the internal collimating lens. The only adjustment absolutely required is the lateral adjustment of the reference and test point image locations. This is accomplished by alignment of the reference surface 30b that is bonded permanently to the beam splitter 30a during manufacture for robustness and stability.

[0067] The preferred alignment mode is to make a cat's eye type reflection by focussing the test arm on a surface 24 so that a point image appears on the camera 32. The reference surface 30b is then slid into place so that the two spots appear as one spot. Usually, UV (ultraviolet) curing adhesive is used to bond the reference surface 30b once alignment is obtained. In use, the PSM test arm point image will always appear coincident with the reference spot laterally for a cat's eye type reflection and will require lateral adjustment for a retroreflection (e.g., focus at the center of curvature of a spherical surface).

[0068] An alternative is to intentionally separate the two point images. The benefit of doing this is so that one may more easily identify a cat's eye reflection from a retroreflection and to more easily judge best focus.

[0069] Lastly, it is possible to intentionally introduce some astigmatism into the test arm so the spot image created is a point at best focus but becomes a line focus away from best focus. The line focus produced by moving the PSM inside of focus is orthogonal to the line orientation when outside of focus. Astigmatism can be introduced by introducing a weak cylindrical lens between the collimating lens 52 and objective lens 26, 126, for example.

[0070] Thus, there has been disclosed a point source microscope (PSM), including its assembly, alignment, and use. It will be readily apparent to those skilled in this art that various changes and modifications of an obvious nature may be made, and
5 all such changes and modifications are considered to fall within the scope of the present invention, as defined by the appended claims.